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J. [GB/GB]; c/o Philips Intellectual Property & Standards,  
Cross Oak Lane, Redhill, Surrey RH1 5HA (GB).

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(74) Agent: **WILLIAMSON, Paul, L.**; Philips Intellectual  
Property & Standards, Cross Oak Lane, Redhill, Surrey  
RH1 5HA (GB).

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(71) Applicant (*for all designated States except US*): **KONIN-  
KLJKE PHILIPS ELECTRONICS N.V.** [NL/NL];  
Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

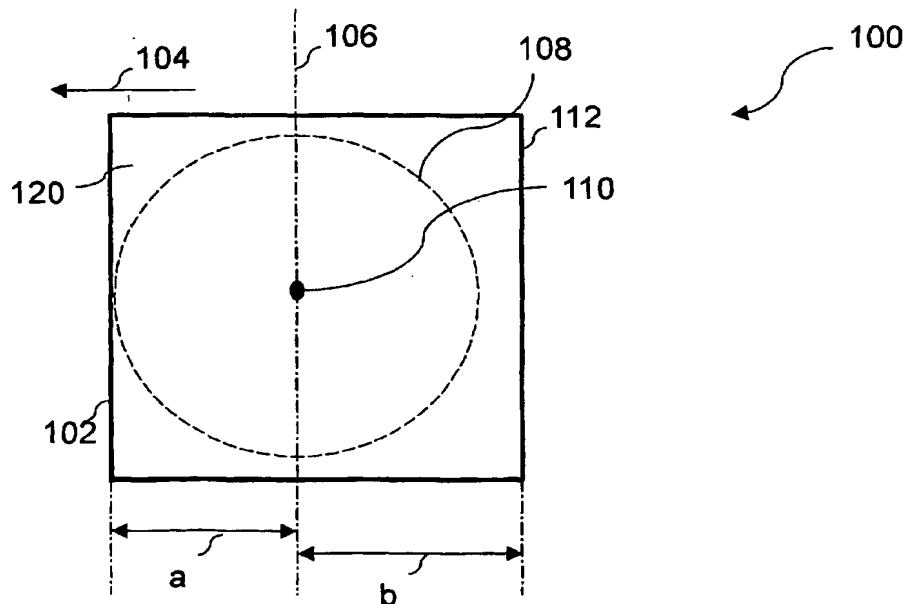
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(72) Inventor; and

(75) Inventor/Applicant (*for US only*): **PHILPOT, Timothy,**

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(54) Title: DISC CARTRIDGE



(57) Abstract: A disc cartridge comprising a planar casing (120) and a disc shaped media (108) accommodated therein is disclosed wherein, in use, the cartridge is inserted into a corresponding disc drive by first inserting a leading edge (102) of the casing through an aperture of such a disc drive in a direction (104) in the plane of the casing; and wherein the distance (b) from a trailing edge (112) of the casing (being that furthest from the leading edge) to an imaginary line (106) which is in the plane of the casing, perpendicular to the direction of insertion (104) and passes through the centre (110) of the disc shaped media (108) is at least 10% greater than the distance (a) from the leading edge (102) of the casing to the imaginary line (106).

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## DESCRIPTION

## DISC CARTRIDGE

5           This invention relates to a disc cartridge comprising a planar casing and a disc shaped media accommodated therein wherein, in use, the cartridge is inserted into a corresponding disc drive by first inserting a leading edge of the casing through an aperture of such a disc drive in a direction in the plane of the casing.

10

Such disc cartridges, in respect of which the casing protects the media from handling, dust and the like, are well known including, for example, a conventional floppy disk for a PC.

Typically, to minimise the physical size of such cartridges, the dimensions of casings are only slightly larger than the diameter of disc shaped media accommodated therein. For example, where such a cartridge is square or slightly rectangular, straight edges are only slightly larger than the diameter of the disc shaped media. Similarly, in respect of "D" shaped casings, known from US Patent 6,205,116, the single straight edge is only slightly larger than the diameter of the disc shaped media and the curved edge follows the media's circumference.

20

It is an object of the invention to improve on the known art.

25           In accordance with the present invention, a disc cartridge of the type described above is provided wherein the distance from a trailing edge of the casing (being that furthest from the leading edge) to an imaginary line which is in the plane of the casing, perpendicular to the direction of insertion and passes through the centre of the disc shaped media is at least 10% greater than the distance from the leading edge of the casing to the imaginary line.

30

The inventor has appreciated that a disadvantage of conventional cartridges is that they may not be readily handled without incidental handling

of sensitive components of the casing such as the shutter, thereby potentially exposing the shutter and / or the disc media to damage. This is particularly so when a disc cartridge is small. The asymmetry in accordance with the present invention improves handling of such cartridges.

5           The asymmetry also enables the orientation of a cartridge to be readily ascertained thereby simplifying insertion of such a cartridge in a disc drive.

Furthermore, the asymmetry may also simplify ejection if the trailing edge of the cartridge at least partially protrudes from a disc drive whereby it can be manually gripped to remove the cartridge from the disc drive.

10           The distance from the trailing edge of the casing to the imaginary line may be at least 25%, 50% or even 80% greater than the distance from the leading edge of the casing to the imaginary line.

Advantageously, the casing proximate to the trailing edge permits the use of a more efficient shutter arrangement such that when the cartridge is in  
15 use in the drive unit, the casing has only a single layer of protection for the portion of the disc shaped media not exposed for access by a head.

The present invention will now be described, by way of example only, with reference to the accompanying figures in which:

20           Figure 1 shows, schematically, a first disc cartridge;  
            Figure 2 shows, schematically, a second disc cartridge;  
            Figure 3 shows, schematically, a third disc cartridge; and  
            Figure 4 shows, schematically, a fourth disc cartridge.

25           Figure 1 depicts a first disc cartridge, shown generally at 100. The cartridge comprises a planar casing 120 accommodating disc shaped media 108. The planar casing comprises a leading edge 102 corresponding to the direction of insertion 104 of the cartridge into a corresponding drive unit. A distance 'a' is calculated from the leading edge 102 to an imaginary line 106  
30 which is in the plane of the casing perpendicular to the direction of insertion 104 and passes through the centre 110 of the disc shaped media 108. A distance 'b' is calculated from the imaginary line 106 to trailing edge 112 of the

casing, the trailing edge 112 being that edge of the casing furthest from the leading edge 102. Distance 'b' is at least 10% greater than distance 'a'.

A user can establish the orientation of a disc cartridge by means of one or more visual clues. Consider the 3.5inch floppy disk commonly used in PCs, such clues include identifying a side of the disk by means of the metal drive coupling plate, the leading (insertion) edge by means of the shutter and of course the arrow symbol located near a corner of the casing. As new types of disc cartridge are developed, the provision of suitable visual clues to determine orientation is highly desirable. However, the trend to smaller sized disc media and corresponding cartridge size reduction, especially for compact mobile products, will mean that visual clues will be smaller and therefore less easy to discern. Furthermore, as data density increases (i.e. bytes per unit area), the need to protect media from dust and dirt contamination means that, when not in use, the disc media may be fully enclosed, thereby potentially removing one or more clues (e.g. the drive coupling plate). The present invention recognises and solves this problem by providing a suitable visual clue for any type of disc cartridge, the clue being inherently familiar to any user and having physical properties which provide further advantages in terms of performance and manual handling, as discussed in more detail below. It has been found that when distance 'b' is at least 10% greater than distance 'a' a user is able to readily establish the orientation of the cartridge for example in order to insert the cartridge into a suitable drive unit.

Figure 2 depicts, schematically, a second disc cartridge shown generally at 200. The cartridge comprises a planar casing 220 accommodating disc shaped media 208. The planar casing comprises a leading edge 202 corresponding to the direction of insertion 204 of the cartridge into a corresponding drive unit. A distance 'a' is calculated from the leading edge 202 to an imaginary line 206 which is in the plane of the casing perpendicular to the direction of insertion 204 and passes through the centre 211 of the disc shaped media 208. A distance 'd' is calculated from the imaginary line 206 to trailing edge 212 of the casing, the trailing edge 212 being that edge of the casing furthest from the leading edge 202. The cartridge further comprises a

shutter 210 (denoted by the heavy outline) which, when inserted into a drive unit, is slideably moveable in the plane of the casing by a distance 'c' and in a direction opposite to the direction of insertion so as to expose a portion of the disc media for access by a head. When fully open, the edge 213 of shutter 210 is located at line 214. Clearly, the above arrangement applies to other types of shutter, including those which expose a radius of the disc media. Distance 'd' is determined in order to allow a suitably sized handling region 216 to be formed proximate to the trailing edge. The presence of the handling region facilitates at least two functions : a visual clue as to the orientation of the cartridge and also a means to manually handle the cartridge. As shown in the figure, region 216 does not overlap the disc 208 or the opened shutter (the edge 213 of which being located at 214); such an arrangement can help protect the disc and/or shutter from handling damage. Unlike prior art disc cartridges, region 216 allows the cartridge to be handled along one entire edge of the cartridge without risking consequent damage to the disc. Distance 'd' could be arranged to allow manual handling using finger and thumb, for example 'd' is approximately 9mm larger than the radius of the disc media. As an example, disc media with a 15mm radius might result in a cartridge casing where distance 'd' is around 50% greater than distance 'a'. The embodiment shown allows the cartridge to be handled for insertion into a drive unit. In the case where a cartridge has been loaded into the drive unit, its trailing edge may suitably be arranged to protrude from the drive unit thereby allowing a user to manually eject the cartridge from the drive unit by means of gripping region 216. Alternative cartridge ejection means may be provided.

Figure 3 depicts, schematically, a third disc cartridge shown generally at 300. The cartridge comprises a planar casing 320 accommodating disc shaped media 308. The planar casing comprises a leading edge 302 corresponding to the direction of insertion 304 of the cartridge into a corresponding drive unit. A distance 'a' is calculated from the leading edge 302 to an imaginary line 306 which is in the plane of the casing perpendicular to the direction of insertion 304 and passes through the centre 311 of the disc shaped media 308. A distance 'e' is calculated from the imaginary line 306 to trailing edge 312 of the

casing, the trailing edge 312 being that edge of the casing furthest from the leading edge 302. The cartridge further comprises a shutter 310 (denoted by the heavy outline) which, when inserted into a drive unit, is slideably moveable in the plane of the casing by a distance 'c' and in a direction opposite to the direction of insertion so as to expose a portion of the disc media. When the shutter 310 is in its closed position (as shown in Figure 3), region 316 is available for determining orientation and allowing handling, as discussed earlier. Inserting the cartridge into the drive might be performed by initially inserting the cartridge into the drive and then completing the insertion by pushing its trailing edge using a thumb or finger. When the cartridge is fully inserted into the drive unit, the shutter overlaps and conceals region 316. This could act as a useful visual indication that the cartridge is fully inserted into the drive; it might also help prevent the drive being removed in an uncontrolled way (e.g. by a user simply manually grasping and removing the cartridge) as a consequence help ensure data integrity. Instead, an ejection means can be provided on the drive unit whereby, when operated, the cartridge is partially ejected from the drive unit; this causes the shutter 310 to partially or fully close and thereby reveal at least a part of region 316 which can then be gripped by a user to complete the ejection of the cartridge from the drive unit. Optionally, the trailing edge of a fully inserted cartridge can be designed to seal the aperture of the disc drive using means readily identifiable by persons skilled in the art. Furthermore, the arrangement described allows cartridges to be constructed such that, in use in the drive unit, the casing comprises a single layer of protection for the portion of the disc shaped media not exposed for access by a head. This contrasts with, for example, the standard 3.5inch PC floppy disk in which a portion of the disk has a two layer covering when loaded into a suitable disk drive unit. An advantage is that the dimension perpendicular to the plane of the cartridge can be reduced which in turn allows a reduction in the size of the corresponding disc drive – an important factor for small form factor media and mobile products. Another advantage is a potentially low cost cartridge due to less parts, materials and simple construction. Clearly, the above arrangement can also apply to other types of

shutter, including those which expose a radius of the disc media. Consider an example of a cartridge accommodating a disc media with radius 15mm. Presuming dimension 'c' is 9mm, distance 'e' is likely to be approximately 25% greater than distance 'a'.

5        Figure 4 depicts, schematically, a fourth disc cartridge shown generally at 400. The cartridge comprises a planar casing 420 accommodating disc shaped media 408. The planar casing comprises a leading edge 402 corresponding to the direction of insertion 404 of the cartridge into a corresponding drive unit. A distance 'a' is calculated from the leading edge 402  
10    to an imaginary line 406 which is in the plane of the casing perpendicular to the direction of insertion 404 and passes through the centre 411 of the disc shaped media 408. A distance 'f' is calculated from the imaginary line 406 to trailing edge 412 of the casing, the trailing edge 412 being that edge of the casing furthest from the leading edge 402. The cartridge further comprises a  
15    shutter 410 (denoted by the heavy outline) which, when inserted into a drive unit, is slideably moveable in the plane of the casing by a distance 'c' in a direction opposite to the direction of insertion so as to expose a portion of the disc media, edge 413 of the shutter being positioned at 414 when the shutter is fully open. Region 416 can be used to handle the cartridge irrespective of  
20    whether the shutter is closed or open. Suitably, when the cartridge is fully inserted into the disk drive, region 416 remains exposed and can be used for example to manually eject the cartridge by grasping region 416 and withdrawing the cartridge from the disc drive. Consider an example of a cartridge accommodating a disc media with radius 15mm. Presuming  
25    dimension 'c' is 9mm and assuming a similar sized region 416 compared to region 216 in the embodiment of Figure 2, distance 'f' is in this example approximately 80% greater than distance 'a'.

30        The foregoing implementations are presented by way of example only and represent a selection of a range of implementations that can readily be identified by a person skilled in the art to exploit the advantages of the present invention. Disc cartridges other than those which are rectangular can also



embody the invention, for example a disc cartridge wherein one or more edges are arcuate.

In the description above and with reference to Figure 1 there is disclosed a disc cartridge comprising a planar casing 120 and a disc shaped media 108  
5 accommodated therein is disclosed wherein, in use, the cartridge is inserted into a corresponding disc drive by first inserting a leading edge 102 of the casing through an aperture of such a disc drive in a direction 104 in the plane of the casing; and wherein the distance 'b' from a trailing edge 112 of the casing (being that furthest from the leading edge) to an imaginary line 106  
10 which is in the plane of the casing, perpendicular to the direction of insertion 104 and passes through the centre 110 of the disc shaped media 108 is at least 10% greater than the distance 'a' from the leading edge 102 of the casing to the imaginary line 106.

## CLAIMS

1. A disc cartridge (100) comprising a planar casing (120) and a disc shaped media (108) accommodated therein; wherein, in use, the cartridge is inserted into a corresponding disc drive by first inserting a leading edge (102) of the casing through an aperture of such a disc drive in a direction (104) in the plane of the casing; and wherein the distance (b) from a trailing edge (112) of the casing (being that furthest from the leading edge) to an imaginary line (106) which is in the plane of the casing, perpendicular to the direction of insertion (104) and passes through the centre (110) of the disc shaped media is at least 10% greater than the distance (a) from the leading edge (102) of the casing to the imaginary line (106).  
5
2. A cartridge as claimed in claim 1 wherein the distance from the trailing edge of the casing to the imaginary line is at least 25% greater than the distance from the leading edge of the casing to the imaginary line.  
15
3. A cartridge as claimed in claim 1 wherein the distance from the trailing edge of the casing to the imaginary line is at least 50% greater than the distance from the leading edge of the casing to the imaginary line.  
20
4. A cartridge as claimed in claim 1 wherein the distance from the trailing edge of the casing to the imaginary line is at least 80% greater than the distance from the leading edge of the casing to the imaginary line.  
25
5. A cartridge as claimed in any preceding claim wherein in use in the drive unit, the casing has only a single layer of protection for the portion of the disc shaped media not exposed for access by a head.

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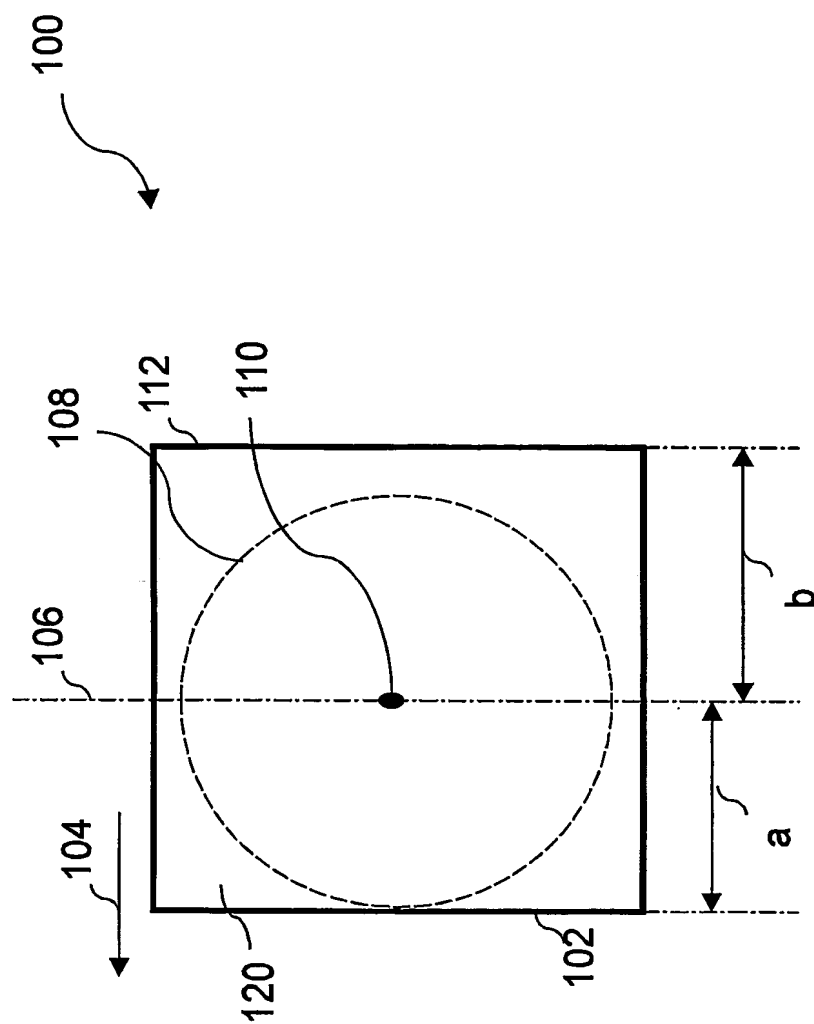


FIG.1

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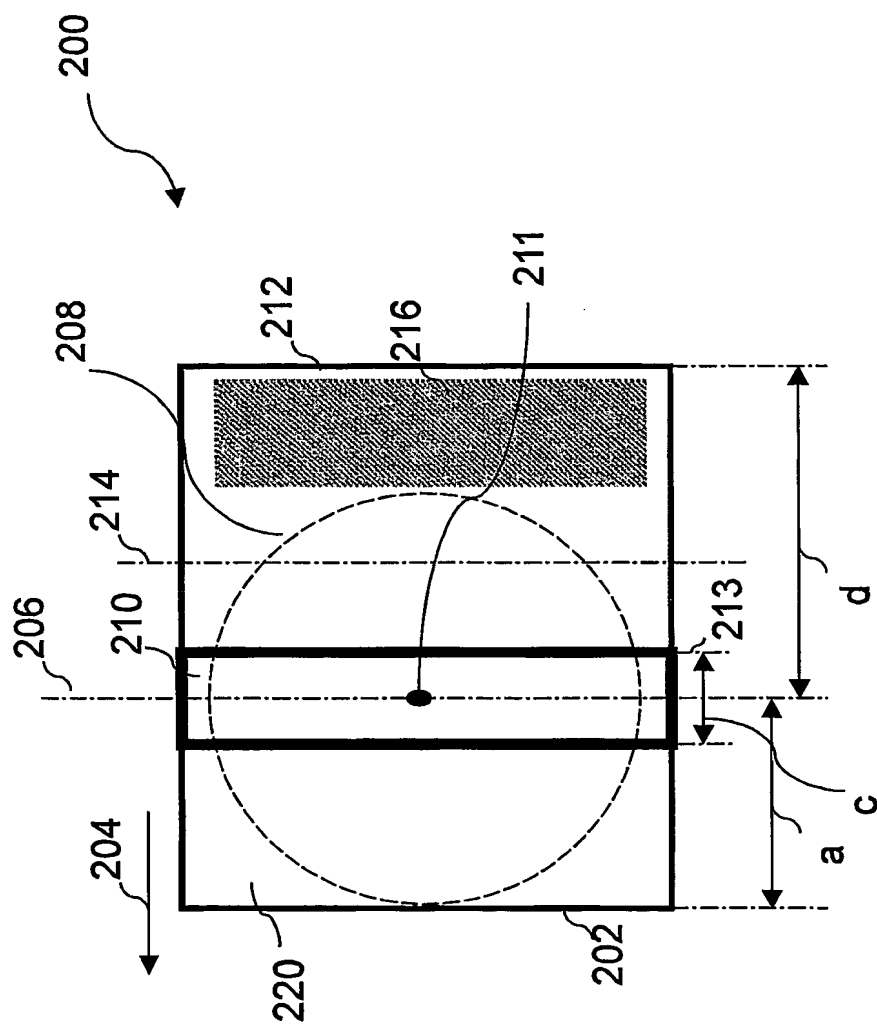
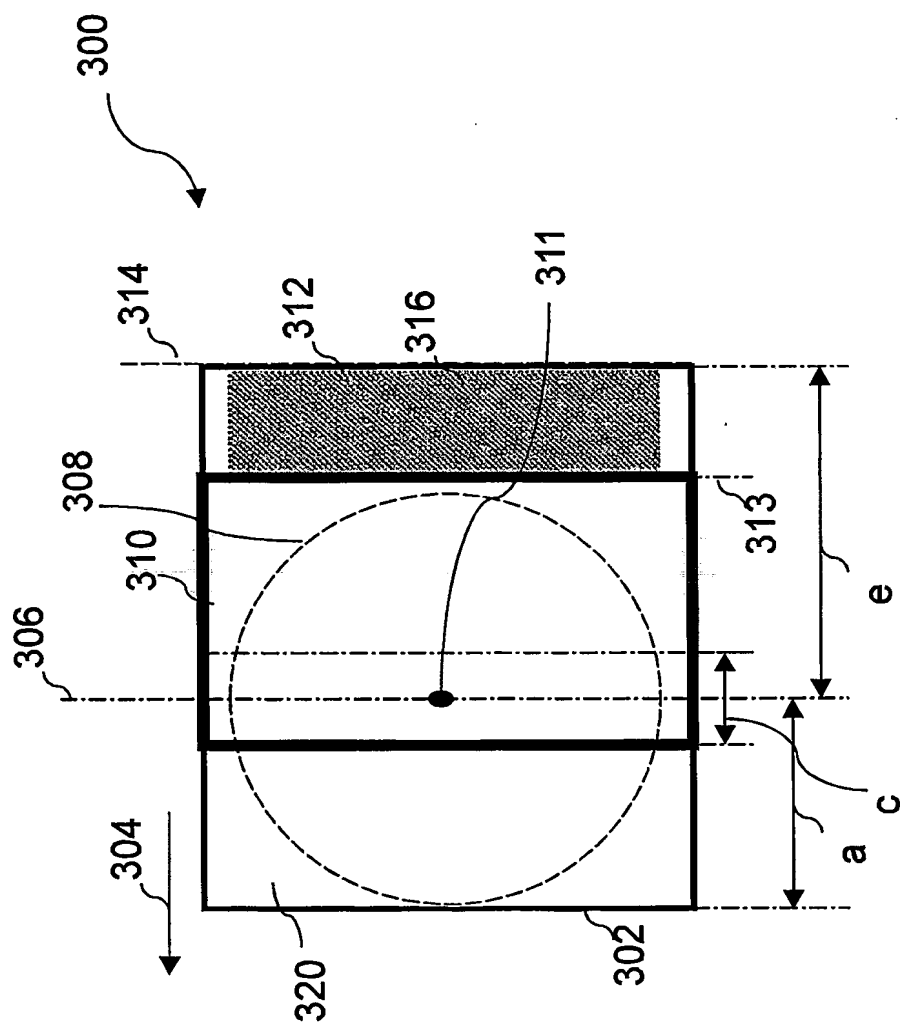


FIG. 2



**FIG. 3**

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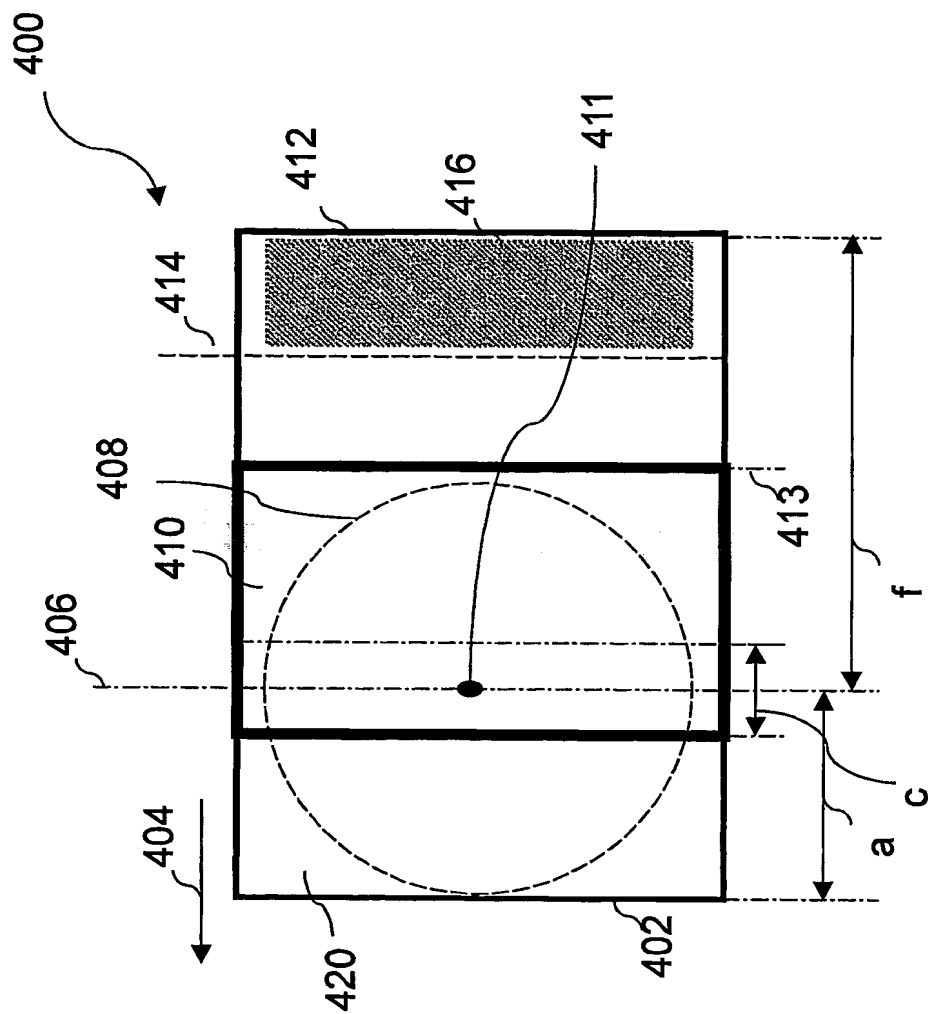


FIG. 4

## INTERNATIONAL SEARCH REPORT

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## A. CLASSIFICATION OF SUBJECT MATTER

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According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G11B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data, EPO-Internal, PAJ

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☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

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